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Attorney Docket 5475

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JC949 U.S. PTO

THE COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of:  
Inventor: Robert James Monson, Wesley Eugene Revely, and Trevor J. McCollough  
For: SHOCK AND VIBRATION SYSTEM  
Enclosed are:

JC915 U.S. PTO  
09/694458  
10/23/00

- ☒ 3 sheets of drawing.
- ☐ An assignment of the invention to Lockheed Martin
- ☐ A certified copy of a \_\_\_\_\_ application.
- ☐ An associate power of attorney.
- ☐ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.
- ☐ PTO 1449

The filing fee has been calculated as shown below:

BASIC FEE				\$710.00
TOTAL CLAIMS	- 20 =	0	X 10=	0
INDEPENDENT CLAIMS	- 3 =	0	X 30=	0
TOTAL				\$710.00

☐ Please charge my Deposit Account No. 10-0210 in the amount of \$ \_\_\_\_\_. A duplicate copy of this sheet is enclosed.

☒ A check in the amount of \$710.00 to cover the filing fee is enclosed.

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☒ Any additional filing fees required under 37 CFR 1.16.

☐ Any patent application processing fees under 37 CFR 1.17.

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☐ The issue fee set in 37 CFR 1.18 at or before mailing of the Notice of Allowance, pursuant to 37 CFR 1.311(b).

☒ Any filing fees under 37 CFR 1.16 for presentation of extra claims.

JACOBSON AND JOHNSON

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JC915 U.S. PTO  
09/694458  
10/23/00

October 23, 2000

Box Patent Application  
Assistant Commissioner of Patents  
Washington, D. C. 20231

SUBJECT: Applicant: Robert James Monson and Wesley Eugene Revely  
For: SHOCK AND VIBRATION SYSTEM  
File: 5475

Sir:

The enclosed subject application with 3 sheets of drawings is being sent by Express Mail No. **EK978908813US**. Under the provisions of 1.10 and 1.53, the applicant request the application be given the filing date of October 23, 2000.

Applicant's attorney, Carl L. Johnson, certifies that the application is being deposited with the United States Postal Service by Express Mail **EK978908813US** in an envelope addressed to: BOX PATENT APPLICATION, Assistant Commissioner of Patents, Washington, D.C. 20231 on October 23, 2000.

Oct 23, 2000

Date

Carl L. Johnson

Carl L. Johnson

The Declaration is unsigned and no fee is included.

Yours very truly,

JACOBSON AND JOHNSON

By

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## SPECIFICATION

### TO WHOM IT MAY CONCERN

BE IT KNOWN, That we Robert James Monson, a citizen of the United States, residing in St. Paul, Ramsey County, State of Minnesota; Wesley Eugene Revely, a citizen of the United States, residing in Apple Valley, Dakota County, State of Minnesota; and Trevor J. McCollough, a citizen of the United States, residing in Minneapolis, Hennepin County State of Minnesota have invented new and useful improvements in SHOCK AND VIBRATION SYSTEM of which the following is a specification.

### FIELD OF THE INVENTION

- 5 This invention relates generally to shock and vibration isolation systems and more specifically to a compact symmetrical shock and vibration isolation system that provides three axis isolation for shock and vibration.

### BACKGROUND OF THE INVENTION

- 10 The concept of shock isolation systems is known in the art. Typically, shock mounts support a cabinet or workstation through a set of shock mounts that enable an external shock to the system to be attenuated by the shock mounts before it damages equipment mounted in the cabinet or the workstation.
- 15 The present invention comprises an improved shock and vibration isolation system wherein a plurality of shock mounts arranged in symmetrical condition provide for three axis shock and vibration protection while at the same time providing a compact system wherein the system can utilize the interaction between adjacent components to assist in attenuation of shocks and vibrations.

20

### SUMMARY OF THE INVENTION

- Briefly, the present invention comprises a compact shock and vibration isolation system whereby a plurality of shock mounts are cantileverly and symmetrically positioned between an outer member and an inner member which is centrally positioned with respect to the
- 25 outer member to enable the equipment located thereon to assist in attention of shock and vibration.

### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side section view of a compact shock and vibration system having a radially extending platform;

5 Figure 2 is a top view of the compact shock and vibration system of Figure 1;

Figure 3 is top view of a compact shock and vibration system having cabinets peripherally positioned about a center support;

10 Figure 4 is a side sectional view of the compact shock and vibrations system of Figure 3;

Figure 5 is top view of a compact shock and vibration system having a rectangular platform cantileverly supported by a center member;

15 Figure 6 is a top view of a cylindrical compact shock and vibration system with a shock and vibration isolation compartment located centrally within an outer cylindrical support; and

Figure 7 is a side sectional view of the compact shock and vibration system of Figure 6.

20

### DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 is a side sectional view of a compact shock and vibration system 10 having a radially extending platform 12. A rigid mounted center pole 13 extends vertically upward through a central opening 11 in platform 12. Shock and vibrations, which are received by  
25 center pole 13, are isolated from the platform 12 by the symmetrical positioning of radially extending shock mounts 18, 19, 20 and 21 (see Figure 2). Opening 11 provides sufficient radially spacing between center pole 13 and platform 12 so that a shock or vibration to the

center pole 13 does not produce platform displacement sufficient to produce direct contact between the center pole 13 and platform 13. Figure 1 shows that cantileverly extending outward from center pole 13 are elastomeric shock mounts 18 and 19 that each have one end fixedly secured to pole 13 and the other end fixedly secured to platform 12. A first  
5 workstation 27 and a second workstation 28 are shown mounted on platform 12.

Figure 2 is a top view of the compact shock and vibration system of Figure 1 showing four elastomeric shock mounts 18, 19, 20 and 21 radially and symmetrically positioned about center pole 13, much like the spokes on a wheel. Each of elastomeric shock mounts 20 and  
10 21 have one end fixedly secured to pole 13 and the other end fixedly secured to platform 12. Platform 12, which extends radially outward from the center pole 13, includes a first workstation 25, a second workstation 26, a third workstation 27 and a fourth workstation 28. Each of the workstations are symmetrically positioned around the periphery of platform 12 as are the elastomeric shock mounts 18, 19, 20 and 21.

15 In order to provide compactness to the system the workstations can be partially or fully mounted in the radial sector spaces extending between adjacent radially extending elastomers shock mounts. Figure 2 illustrates that workstation 27 is partially mounted within the radial sector space 12a, which is located between radially extending elastomer  
20 shock mounts 19 and 20. Similarly, workstation 26 is partially mounted within the radial sector space 12b which is located between elastomeric shock mounts 20 and 21, workstation 25 is partially mounted within the radial sector space 12c, which is located between elastomeric shock mounts 21 and 18, and workstation 28 is partially mounted within the radial sector space 12d, which is located between elastomeric shock mounts 18  
25 and 19.

Figure 4 is a side sectional view of the compact shock and vibrations system of Figure 3 illustrating that the peripheral cabinets 31 extend vertically along the center post 32 to provide for vertical storage space within the cabinets. In the embodiments shown the peripheral cabinet 31 includes a second set of elastomer shock mounts 40a which are  
5 identical to the first set of elastomer shock mounts 40. The purpose of the second set of shock mounts is to provide for spaced elastomeric support along an axis 32a through post 32, thus enabling the support of an elongated peripheral cabinet 31 therearound.

In the embodiment shown in figure 3 and Figure 4 the elongated peripheral cabinet 31 is  
1 0 located radially exterior of the elastomer shock mounts with the elastomeric shock mounts cantileverly mounted and symmetrical spaced with the elastomeric shock mounts positioned at an approximate 45 degree angle so as to provide shock and vibration isolation in all three mutually coordinate axis.

1 5 Figure 5 is top view of a compact shock and vibration system 50 having a horizontal extending rectangular platform 51 positioned normally outward of and cantileverly supported by a center member 52. Member 52 comprises an elongated wall with a first elastomeric mount 53 having a first end connected to platform 51 and second end connected to member 52. A second elastomer member 54 has a first end connected to platform 51 and  
2 0 as second end connected to center member 52. On the opposite side of system 50 a third elastomeric mount 55 having a first end connected to platform 51a and second end connected to member 52. A second elastomer member 54 has a first end connected to platform 51 and as second end connected to center member 52. System 50 provides for symmetrical positioning of elastomeric shock mounts on each side of wall 52 so that the  
2 5 platform 51a, which connects to platform 51 thorough supports 51c and 51d moves as a unit to thereby cause the inertia of objects on the platform to aid in shock and vibration attenuation.

Figure 6 is a top view of compact cylindrical shock and vibration system 60 with a shock and vibration isolation compartment 61 located centrally within an outer cylindrical support member 62, which may be a silo or the like. In the embodiment shown a plurality of  
5 elastomeric shock mounts 62, 63, 64, 65, 66 and 67 each extend radially outward from a central cabinet 61 to outer support member 61 to provide central support to cabinet 61. Each of the elastomeric shock mounts are symmetrical positioned to provide symmetrical shock and vibration attenuation to the payload in the cabinet 61 and each of the shock mounts have one end affixed to member 62 and the opposite end affixed to cabinet 61.

10 Figure 7 is a side sectional view of the compact shock and vibration system 60 of Figure 6 with the central cabinet 61 positioned along a vertical axis 69. In this embodiment the protected payload, which is located within central cabinet 61, receives symmetrical peripheral support from each of the elastomeric shock mounts as they coact to attenuate  
15 shock and vibrations to the cabinet 61 from radial directions as well as along the vertical axis 69. In system 60 the elongated elastomeric shock mounts are positioned to extend longitudinally between the central cabinet 61 and the outer member 62 which can be rigidly mounted. Access to central cabinet can be obtained through the sector spaces 70, 71, 72, 73 or 74 which are located between each of the adjacent radially extending elastomeric  
20 shock mounts.

Thus the present invention comprises a shock and vibration system for symmetrical isolation of shocks. The system includes a first member having an interior space, a second member, with the second member positioned interiorly with respect to the first member and  
25 a plurality of elastomeric shock mounts, each of the plurality of elastomeric shock mounts having a first end connected to the first member and a second end connected to the second member with each of the elastomeric shock mounts symmetrical positioned in the interior



space to thereby provide either shock or vibration isolation or both between the first member and the second member.

5 The present invention also provides a method of shock and vibration attenuation between a first member and a second member by placing a second member interior to a first member; and symmetrically positioning and mounting a plurality of elastomeric shock mounts between the second member and the first member with each of the elastomeric shock mounts cantileverly extending between the second member and the first member to provide cantilevered support thereto.

10

We claim:

1. A shock and vibration system for symmetrical isolation of shocks comprising:

a first member having an interior space;

a second member, said second member positioned interiorly with respect to said

5 first member; and

a plurality of elastomeric shock mounts, each of said plurality of elastomeric shock mounts having a first end connected to said first member and a second end connected to said second member with each of said elastomeric shock mounts symmetrical positioned in the interior space to thereby provide shock and vibration isolation between said first

10 member and said second member.

2. The shock and vibration system of claim 1 wherein said first member is fixedly mounted.

15 3. The shock and vibration system of claim 1 wherein said second member is fixedly mounted.

4. The shock and vibration system of claim 3 wherein said first member circumferentially surrounds said second member.

20

5. The shock and vibration system of claim 3 wherein said second member comprises a pole with said first member comprising a platform extending radially outward from said pole.

25 6 The shock and vibration system of claim 5 wherein said elastomeric shock mounts cantileverly extend at an acute angle between said first member and said second member.

7. The shock and vibration system of claim 5 wherein a plurality of workstations are symmetrical and concentrically positioned on said platform.

8. The shock and vibration system of claim 6 including at least four elastomeric shock  
5 mounts symmetrical positioned around said pole to form radial sector spaces therebetween with each of said workstations at least partially positioned in said radial sector spaces to provide a symmetrical loading of said elastomeric shock mounts.

9. The shock and vibration system of claim 3 wherein said second member comprises  
10 a pole with said first member comprising a plurality of storage compartments extending radially outward from said pole.

10. The shock and vibration system of claim 2 wherein said second member has a  
15 chamber with a platform therein with said platform coaxially positioned with respect to said first member

11. The shock and vibration system of claim 10 wherein said elastomeric shock mounts  
20 cantileverly support said platform to thereby isolate said platform from shocks to said first member.

12. The method of isolating shocks between a first member and a second member comprising:

placing a second member interior to a first member; and

25 symmetrically positioning and mounting a plurality of shock mounts between said second member and said first member with each of the shock mounts cantileverly extending between said second member and said first member to provide cantilevered support thereto.

13. The method of claim 12 including the step of placing the second member coaxial with the first member.

14. the method of claim 12 including the step of fixedly supporting said second member to enable said first member to provide a shock attenuated platform.

15. the method of claim 12 including the step of fixedly supporting said first member to enable said second member to provide a shock attenuated platform.

10 16. The method of claim 12 including the step of placing multiple workstations on said first member with said multiple workstations symmetrically and concentrically positioned around said first member.

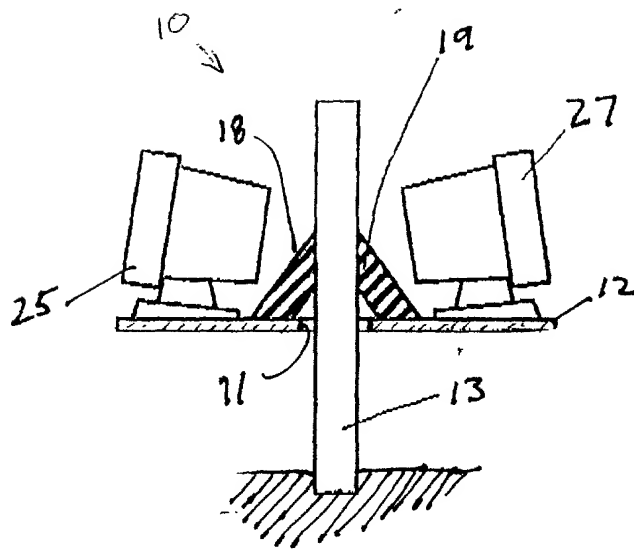
15 17. The method of claim 12 including the step of forming a compartment in said second member with said compartment concentrically positioned with respect to said first member so that each of said shock mounts coact to isolate said compartment from shocks.

18. The method of claim 12 wherein the shock mounts are angularly positioned to provide for shock and vibration attention in three mutually perpendicular axis.

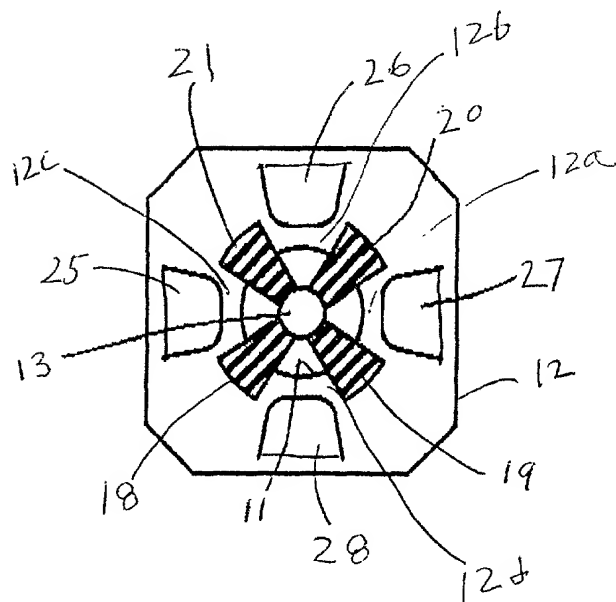
## ABSTRACT OF THE DISCLOSURE

A compact shock and vibration isolation system wherein a plurality of shock mounts are cantileverly and symmetrically positioned between an outer member and an inner member which is centrally positioned with respect to the outer member to enable the equipment

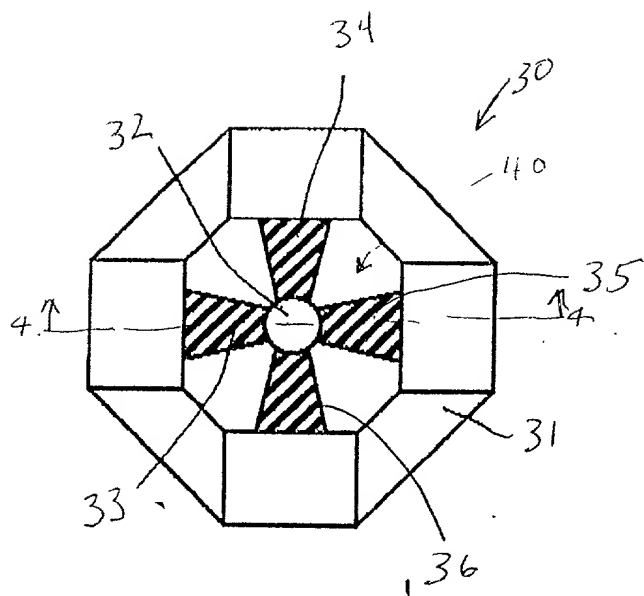
5 located thereon to assist in attention of shock and vibration.



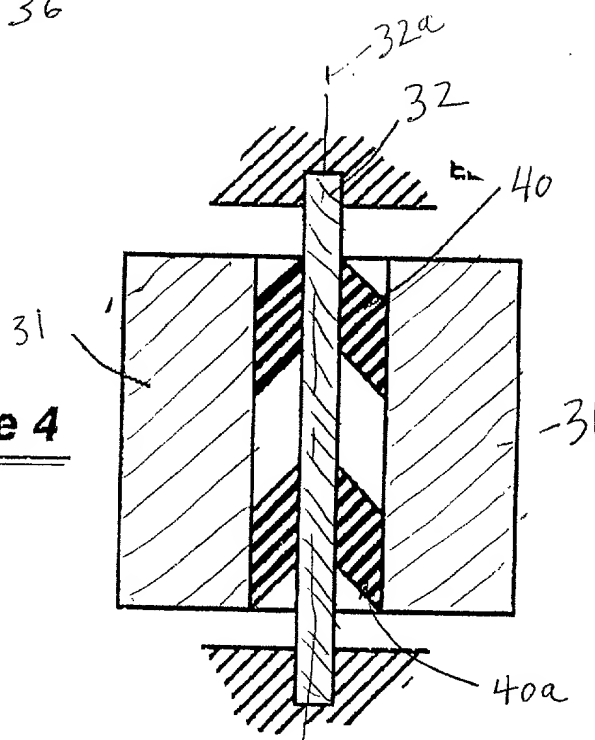
**Figure 1**



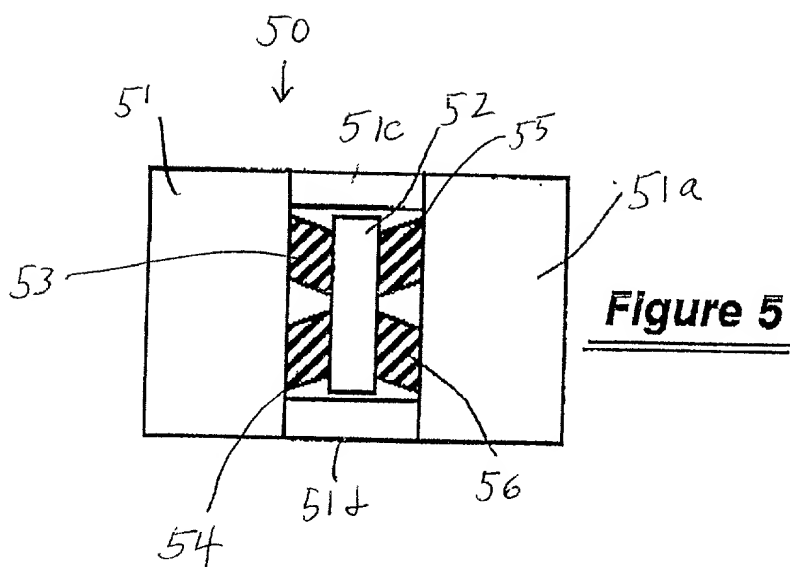
**Figure 2**



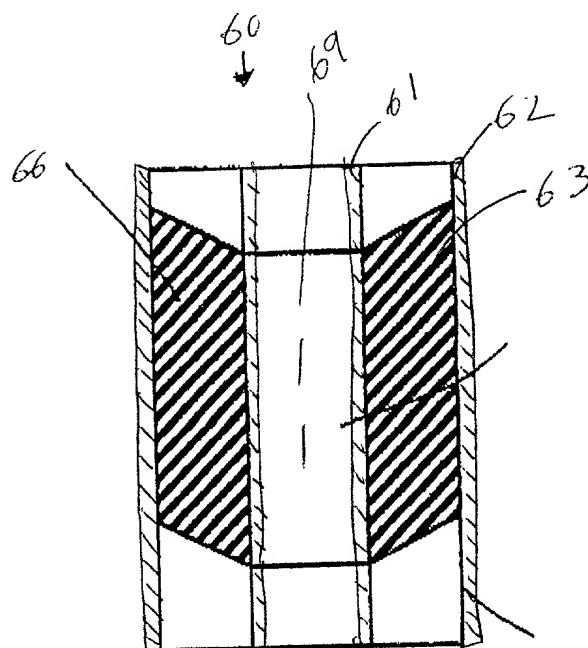
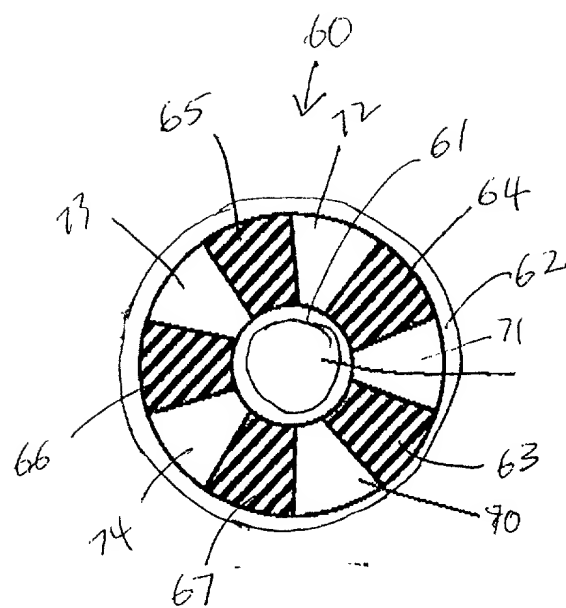
**Figure 3**



**Figure 4**



**Figure 5**





## DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **SHOCK AND VIBRATION SYSTEM**, the specification of which

☒ is attached hereto.

☐ was filed on \_\_\_\_\_ as

Application Serial No. \_\_\_\_\_

and was amended on \_\_\_\_\_ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed  
Yes No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35 United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Serial no. \_\_\_\_\_

(Filing Date) \_\_\_\_\_

(Status-patented, pending, abandoned) \_\_\_\_\_

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Marvin Jacobson, Reg. No. 20,196; Carl L. Johnson, Reg. No. 24,273;

Glenn W. Bowen (Reg. No.22,704); and Patrick M. Hogan Reg. No. 29,543

Address all telephone calls to:

Carl L. Johnson at telephone no. 1-651-222-3775

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Carl L. Johnson  
Jacobson and Johnson  
Suite 285, One West Water Street  
St. Paul, Minnesota 55107-2080

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or third inventor Trevor J. McCollough

Inventor's signature \_\_\_\_\_

Date October 3, 2000

Residence 1704 61st Street West, Minneapolis, Minnesota Citizenship USA

Post Office Address 1704 61st Street West, Minneapolis, Minnesota

## DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **SHOCK AND VIBRATION SYSTEM**, the specification of which

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Full name of sole or first inventor **Robert James Monson**

Inventor's signature Robert J. Monson Date 10/3/00

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Full name of sole or second inventor **Wesley Eugene Revely**

Inventor's signature Wesley E. Revely Date 10/3/00

Residence 14314 Estates Ave., Apple Valley, Minnesota Citizenship USA

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DECLARATION FOR PATENT APPLICATION